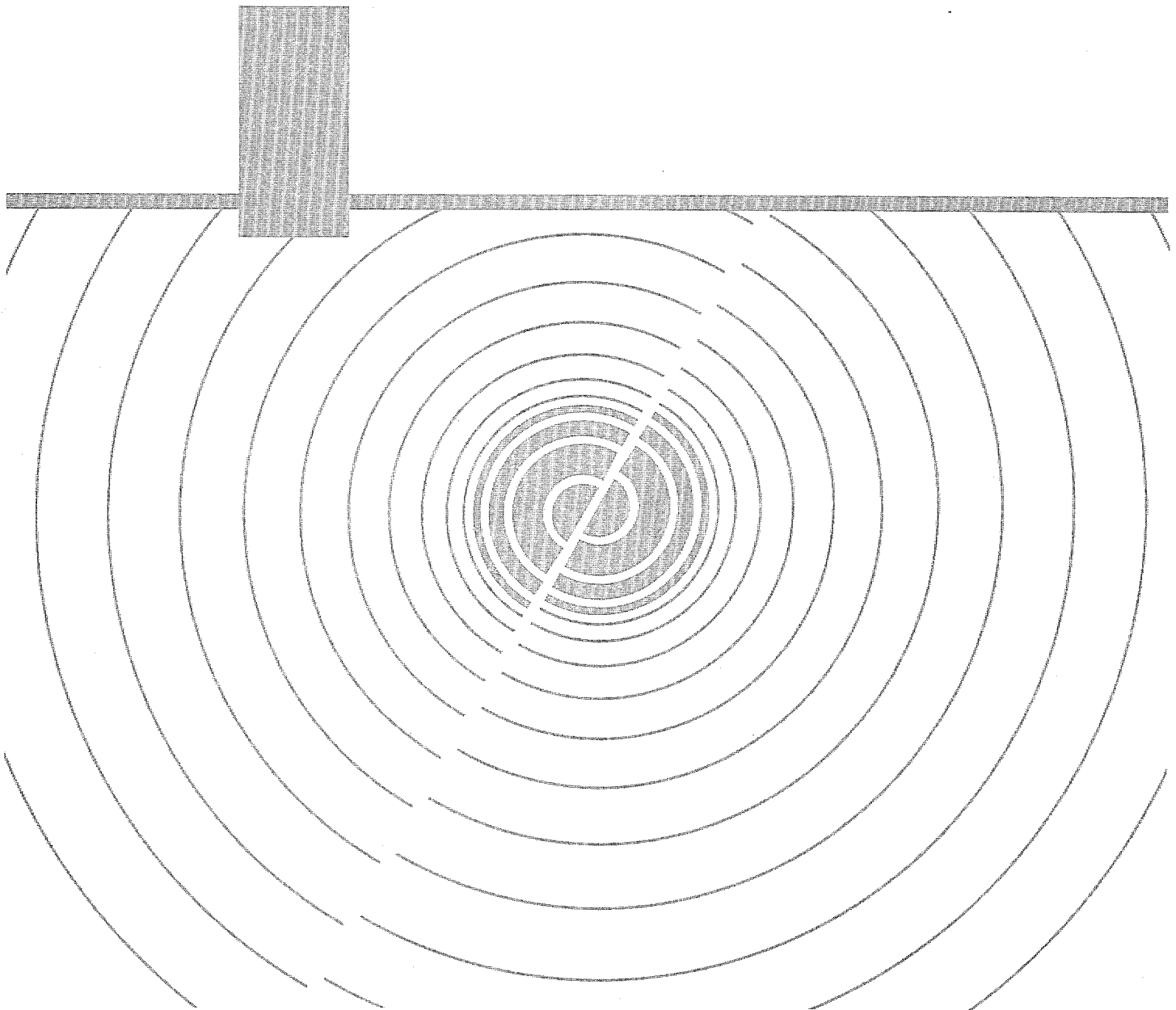

**Appendix I:
Sample Brochures**



Appendix I: Sample Brochures

Brochures are an inexpensive way to deliver your message to a large number of people. Materials in this appendix are set up so that you can photocopy the pages (front and back) and fold them for ready-made brochures.

The brochures are intended for (a) architects and engineers, and others involved in the construction industry and (b) local officials and decision-makers. Four areas are covered:

- Design & Build for Earthquake Safety: A Guide for Architects & Engineers
- Design & Build for Earthquake Safety: A Guide for Local Officials
- Enforce Seismic Code Provisions for Earthquake Safety: A Guide for Architects & Engineers
- Enforce Seismic Code Provisions for Earthquake Safety: A Guide for Local Officials

Use the brochures to generate interest in improving local seismic code provisions. They can also serve as handouts for workshop presentations.

Seismic Protection: Considerations for Local Officials

- ▶ **Seismic codes will not hurt business.** Seismic building codes do not drive business from communities. In the words of one building official, "I've never heard of an industry not coming to town because of seismic requirements." Also, without the code protection, even minor seismic events can force businesses to relocate or temporarily shut down.
- ▶ **Seismic codes are becoming the national norm.** The federal government has set an example with Executive Order 12699, January 1990, which mandates a wide variety of seismic design standards. Seismic codes are becoming more prevalent at all levels of government, which means two things: (a) you will not be at an economic disadvantage for attracting new business and (b) if everyone else does it and you do not, you invite liability. Furthermore, to be eligible for most forms of federal financial assistance for new buildings, your community should adopt one of the model codes with seismic provisions.
- ▶ **Adopting seismic provisions is easy.** Call up a model code organization, buy the code, develop a fee structure (to pay for administration), and contract with the county or another nearby agency for initial staffing.
- ▶ **Seismic provisions are good for the community.** With a seismic code you will know that the community is on its way to seismic safety. The code will reduce long-term liability costs. A good code may ultimately improve the community's insurance rating.
- ▶ **All communities need a seismic code regardless of risk.** Seismic codes supplied by the building code organizations account for your community's level of seismic risk. If your risk is low, the code will reflect that.
- ▶ **Citizens support seismic codes.** Studies in California and the central United States have shown that most citizens support seismic building codes, and that elected officials underestimate this support.

Seismic Building Codes Are Affordable

Seismic codes add relatively little to the cost of a new building; and as experience with seismic design and construction grows, this increment will shrink. A 1985 federal study found that seismic codes increase total building costs by 2.1 percent on average. A 1992 study by the National Association of Home Builders found that builders can construct houses providing for life safety in earthquakes for an additional 1 percent or less of the purchase price. This is a small price to pay for the proven level of protection provided.

How To Learn More About Seismic Building Design

As seismic design practice rapidly spreads throughout the country, it is becoming easier and easier to access educational programs and materials. The model building code organizations now offer materials and seminars on their seismic design requirements. These seminars are sponsored periodically in most states, often by the state emergency management agency. Contact the three model code organizations for more information.

Model Code Organizations

Building Officials and Code Administrators International, Inc. (BOCA)
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Tel: 708-799-2300; fax: 708-799-4981;
<http://www.bocai.org>

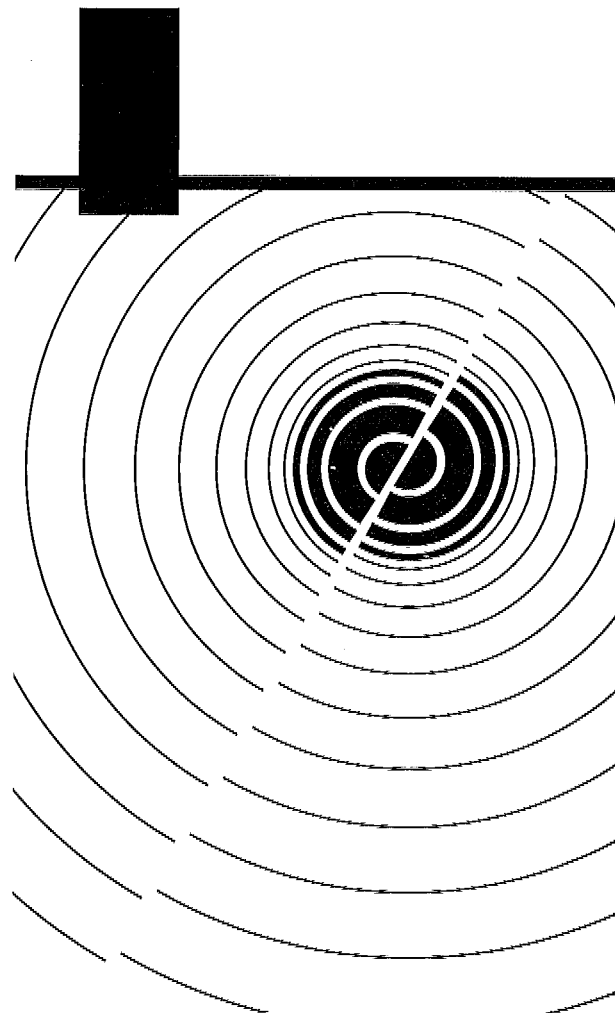
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Design and Build for Earthquake Safety

A Guide for Local Officials



Design and Build for Earthquake Safety

A Guide for Local Officials

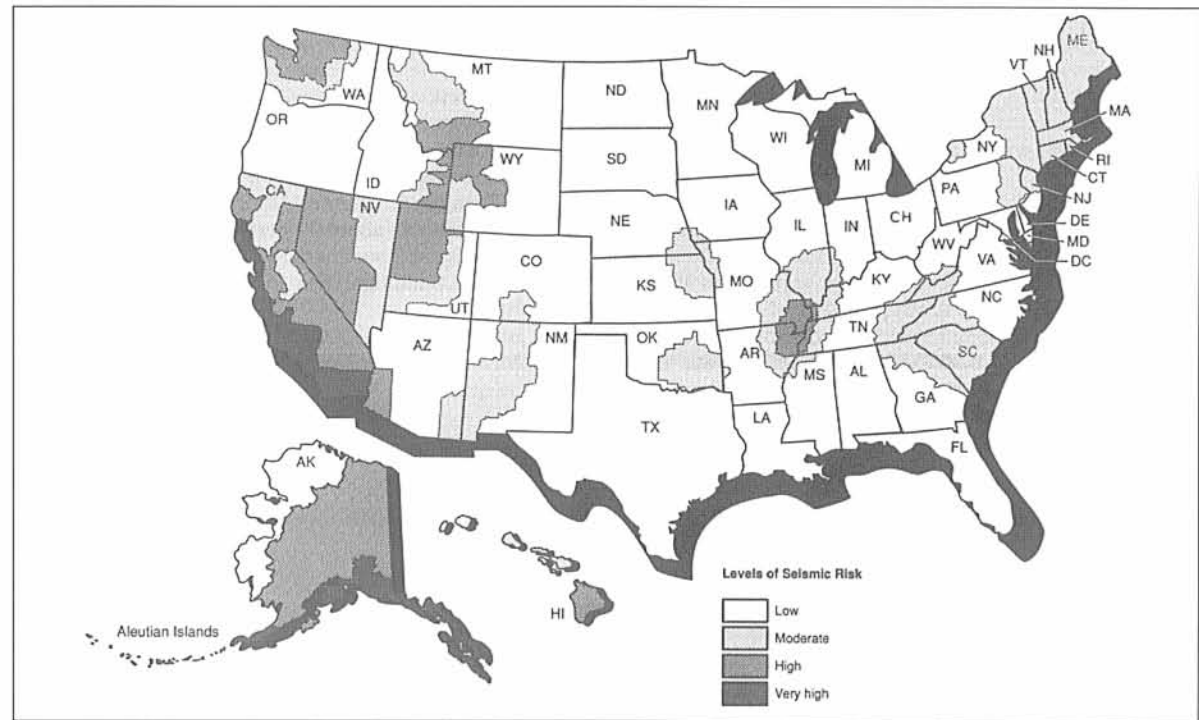
Most parts of the United States have the potential to suffer from earthquake damage. Local officials can help to reduce risk from earthquake damage by adopting a building code that contains current seismic provisions.

Each of the three model building codes specifies seismic code provisions appropriate to a given area's level of hazard. By adopting one of the model codes and incorporating the seismic provisions into new design and building, you can help to ensure that new structures withstand damage and help to protect lives in your community.

Seismic Building Codes Are Specific to Local Conditions

Each model code contains a seismic hazard map, based on current scientific knowledge. Its risk philosophy is accepted by a broad consensus of scientists and design and construction professionals. Its use in seismic design was determined by a nationwide consensus process conducted by the Building Seismic Safety Council (BSSC), an organization of more than fifty construction, professional, and trade organizations.

Portions of thirty-nine states are considered to have some degree of earthquake hazard. Some counties need to design for high levels of earthquake ground-shaking, whereas others should design for relatively less. Conversely, some areas, even those with seismic codes, do not need seismic design at all because the risks are so low. High-risk facilities, of course, demand customized, site-specific analysis.



This seismic hazard map shows that, although the most severe seismic shaking is expected in the western U.S. and Mississippi River areas, much of the U.S. has some level of seismic hazard.

Seismic Building Codes Work

Recent earthquakes in the United States and throughout the world show that seismic codes work. Cities that have built structures to meet seismic codes have suffered much less damage than those without such codes. In the 1995 earthquake in Kobe, Japan, most of the 5,000 fatalities occurred in homes built prior to the advent of modern seismic codes. The 1988 Armenian earthquake destroyed entire communities and killed 25,000 people. The construction standards used in Armenia are similar to those used in much of the United States. The 1989 Loma Prieta and 1994 Northridge, California, earthquakes had relatively low loss of life (63 and 57 deaths, respectively) largely because of the widespread use of seismic building codes.

Smaller seismic events, while receiving less attention from the media, can result in substantial losses to a community. Helena, Montana, experienced an M6.0 event in 1935 (predating

seismic codes) and suffered \$4 million damage, including severe damage to the high school. A Magnitude 5.6 earthquake in 1993 at Scotts Mills, Oregon, caused significant structural damage to a number of unreinforced masonry (brick) buildings. The estimated damage cost to public facilities alone was nearly \$13 million.

Seismic Design Is Becoming the National Norm

Since 1992 all three model codes in the United States have included seismic design provisions. By a 1990 presidential executive order (EO 12699), all federal agencies must require seismic design and construction of all new buildings that they own, lease, regulate, or financially assist, including single-family homes with Federal Housing Authority mortgages. At least thirty-seven states now have seismic design requirements for state-owned buildings. Seismic design is rapidly becoming the standard of practice throughout the United States.

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As seismic design practice rapidly spreads throughout the country, it is becoming easier and easier to access educational programs and materials. The model building code organizations now offer materials and seminars on their seismic design requirements. These seminars are sponsored periodically in most states, often by the state emergency management agency. Contact the three model code organizations for more information.

Professional Organizations:

American Institute of Architects

1735 New York Avenue, NW, Washington, DC 20006
Tel: 202-626-7300; <http://www.aia.org>

American Society of Civil Engineers

1801 Alexander Bell Drive
Reston, VA 20191-4400
Tel: 800-548-2723; <http://www.asce.org>

Model Code Organizations:

Building Officials and Code Administrators International, Inc. (BOCA)

4051 West Flossmoor Road
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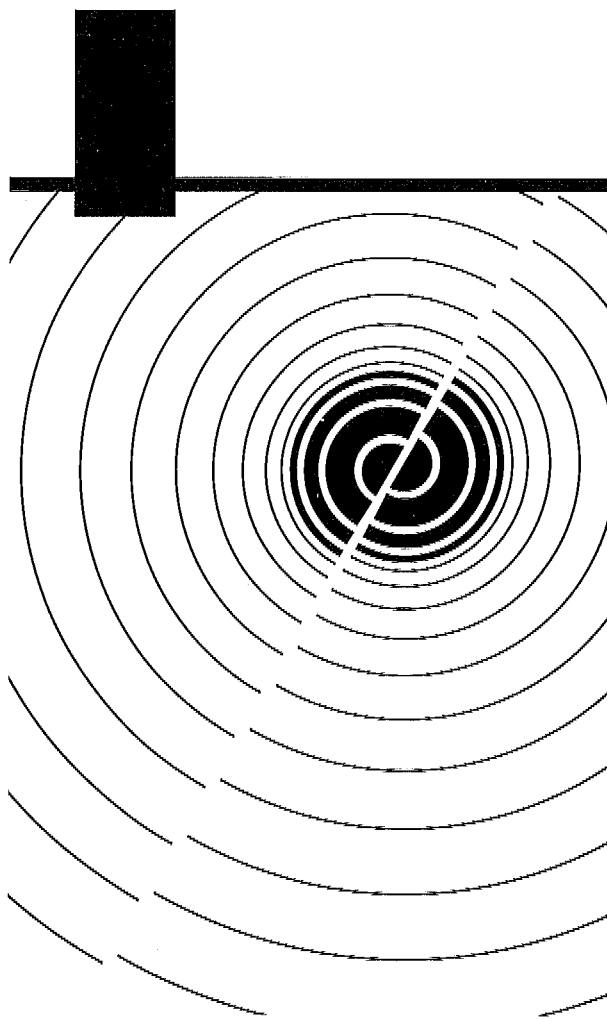
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The Earthquake Engineering Research Institute of Oakland, California (tel: 510-451-0905) has sponsored two-day seismic design seminars in various parts of the country. Also, civil engineering and construction technology programs at many public universities now teach courses, mini-courses, and workshops in seismic design.

Design and Build for Earthquake Safety

*A Guide for Architects
& Engineers*



Design and Build for Earthquake Safety

A Guide for Architects & Engineers

Most parts of the United States have the potential to suffer from earthquake damage. Architects and engineers, as key players in the construction industry, can help to reduce risk from earthquake damage by encouraging the adoption of seismic building codes.

Each of the three model building codes specifies seismic code provisions appropriate to a given area's level of hazard. By adopting one of the model codes and incorporating the seismic provisions into new design and building, you can help to ensure that new structures withstand damage and help to protect lives in your community.

Seismic Building Codes Are Specific to Local Conditions

Each model code contains a seismic hazard map, based on current scientific knowledge. Its risk philosophy is accepted by a broad consensus of scientists and design and construction professionals. Its use in seismic design was determined by a nationwide consensus process conducted by the Building Seismic Safety Council (BSSC), an organization of more than fifty construction, professional, and trade organizations.

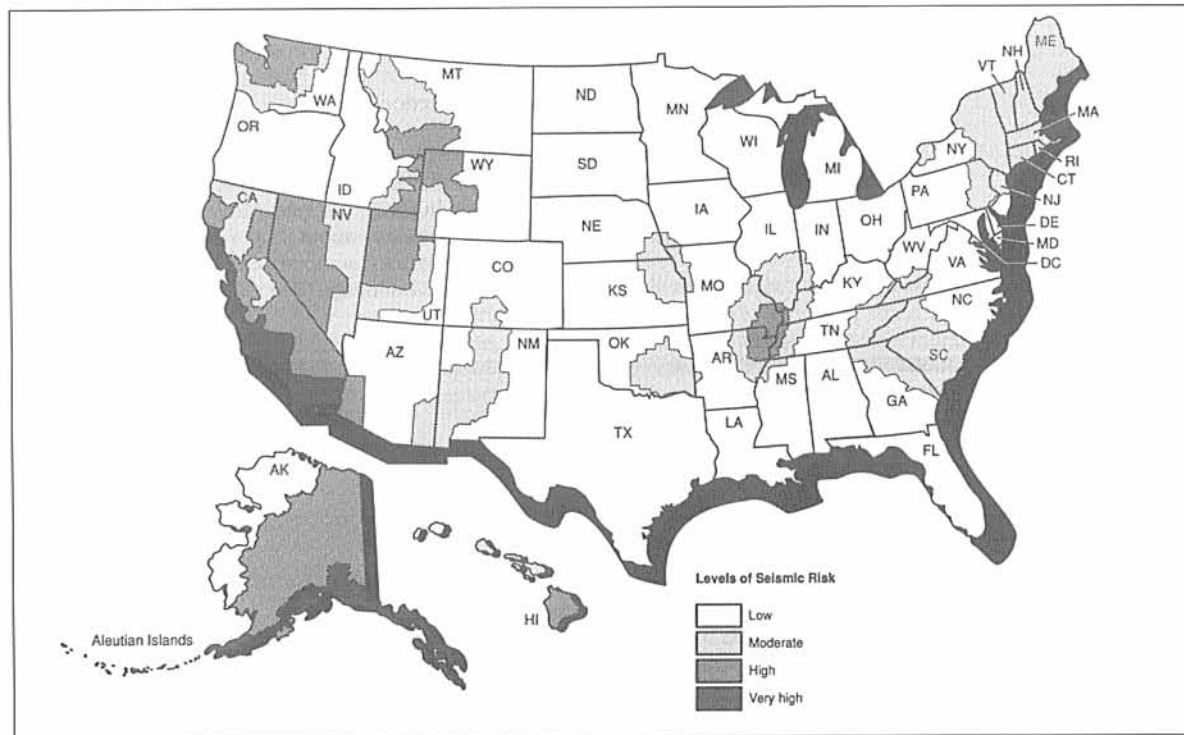
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whether construction is proceeding according to the approved plans and the conditions of the permit. Inspection is typically required at several key stages in the construction process. The inspector has a powerful enforcement tool called a *stop work order*. A stop work order is issued to the construction firm if the inspector finds a code violation that must be corrected before any further construction is performed. At final inspection, the building can be approved for occupancy.

Architects & Engineers Can Help Improve Code Enforcement

Architects and engineers can, and should, help to improve code enforcement. Structures built improperly can damage the architect's professional reputation and may lead to being named in a lawsuit. Secondly, the reputation of the professional as a whole may suffer if numerous errors and failures occur. Some actions you can take include:

- Verify the enforcement capabilities in every jurisdiction in which you work. If possible, find out the code-effectiveness rating of each building department.
- Work with local building departments to convince them of the need for effective enforcement.
- Inspect your own jobs more carefully in jurisdictions with poor enforcement, and inform your client of the reason.
- Work with your local professional organizations to lobby for more effective enforcement.

Model Code Organizations

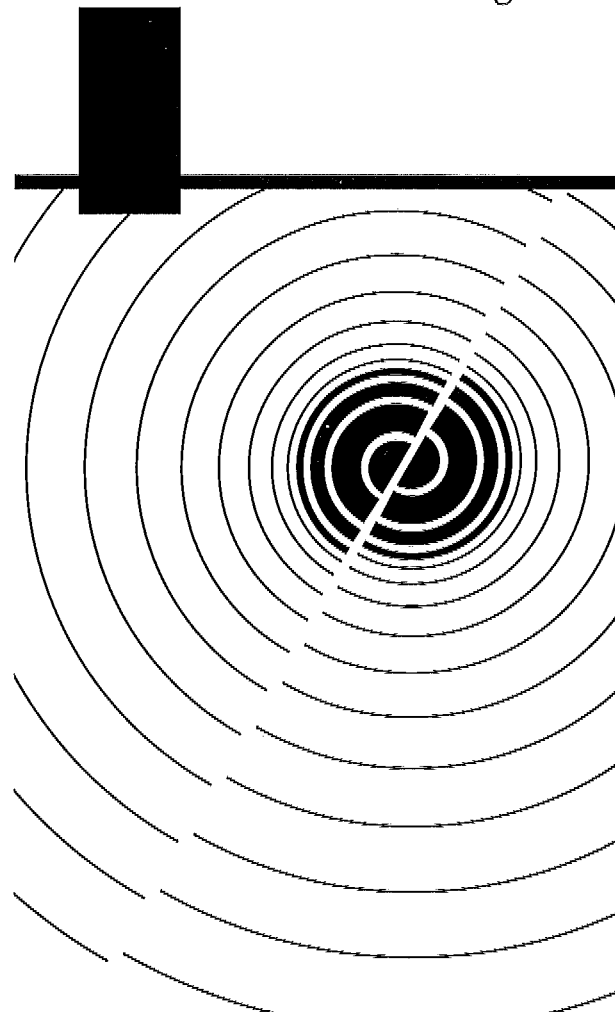
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Enforce Seismic Code Provisions for Earthquake Safety

A Guide for Architects & Engineers



Enforce Seismic Code Provisions for Earthquake Safety

A Guide for Architects & Engineers

A building code is just a book. To achieve the community goal of safer buildings, the building code and its seismic provisions must be enforced—a process in which architects and engineers can play an important role. By specifying practices in accordance with the code, and working closely with code-enforcement personnel, architects and engineers can ensure that safer buildings are constructed according to plan and without costly interruptions.

Poor Code Enforcement Results in Deficient Buildings

Recent studies following Hurricanes Hugo and Andrew have shown weaknesses in code enforcement. In 1991 State Farm Insurance Company contracted with SBCCI (Southern Building Code Congress International, a model code organization) to evaluate code compliance in twelve randomly selected coastal communities. They found that inspectors and reviewers had little or no training in wind-resistant construction and that there was a general lack of enforcement of adequate connections of windows, doors, and mechanical equipment to the building frame. About half of the communities were not enforcing their own code standards for wind resistance. Thus, even in communities with adequate codes, significant damage was attributed to poor compliance and enforcement. With respect to seismic design, a 1993 study by the University of Southern California found significant problems in quality control of seismic-resistant construction in California.

Insurers Recognize the Critical Importance of Code Enforcement

The code-enforcement problems discovered in the wake of Hurricane Andrew have prompted the insurance industry to initiate a code-effectiveness grading schedule, in order to identify communities with good enforcement practices. The new system will be phased in over a five-year period beginning in 1995. Property owners in communities with good code-enforcement practices may be rewarded with reduced insurance premiums.

Elements of Code Enforcement

Code enforcement and administration consist of five sequential elements. For architects and engineers, the most important aspects of enforcement are plan review and construction inspection—but effective code administration must consider the entire sequence.

Code provisions must be up to date. A code is an active document, evolving to reflect new knowledge and new standards of practice. Once a jurisdiction makes a commitment to use a building code, it must be prepared to update its local code on a regular basis.

Builders must apply for permits. Obviously, if builders try to avoid the code-application process, then the code cannot do its job. A jurisdiction must have inspectors out in the field who know the community. The inspector needs to be alert to new construction in his or her jurisdiction and must be aware of current active permits. Architects and engineers can help to ensure that clients obtain building permits.

A qualified reviewer must review building plans. Plan review is one of the two points at

which the local government can affect the details of building construction. At a minimum, the plan review verifies whether the design complies with the building code. This is the most cost-effective moment to catch mistakes, before any money is spent on construction. Some jurisdictions may also review structural calculations.

Architects and engineers can help by specifying practices in accordance with the code and working closely with reviewers. State statutes require that the licensed professional engineer and/or architect place his or her seal and signature on the designs. The seal and signature signify that the design is at the accepted professional standard, which is typically the most recent version of a model building code or technical document. An added incentive for conformity is the legal liability the engineers and architects assume when the seal and signature are placed on the document. Typically, licensed architects and engineers also inspect the construction of their designs.

Construction should proceed according to approved plans. An owner receives a building permit to construct according to the approved plans, and it is the legal responsibility of the owner to do so. The builder uses the plans to order materials and construct the building. The owner may hire inspectors or the engineers and architects to oversee key aspects of the construction in order to help verify compliance with the plans. To some extent, all government inspection systems depend on this obligation by the owner, which is inherent in the issuance of a permit.

A qualified inspector must inspect the construction. Inspection is the second point at which the local government can affect the details of building construction. Inspection verifies

Improving Substandard Enforcement Practices

The most direct way to improve building code enforcement is to increase the quantity or quality of staff. The new code-enforcement grading system may aid local legislative bodies in encouraging or requiring building department staff to participate in continuing education and certification. All the model building code organizations have extensive education programs, including handbooks, workshops, seminars, and videotapes. These programs aim to improve both technical expertise and administrative effectiveness in order to increase the level of professionalism in code administration. Each code organization also has a certification program for a number of categories of plan review and inspection. Certification-based promotions will help to reward staff members for their achievements.

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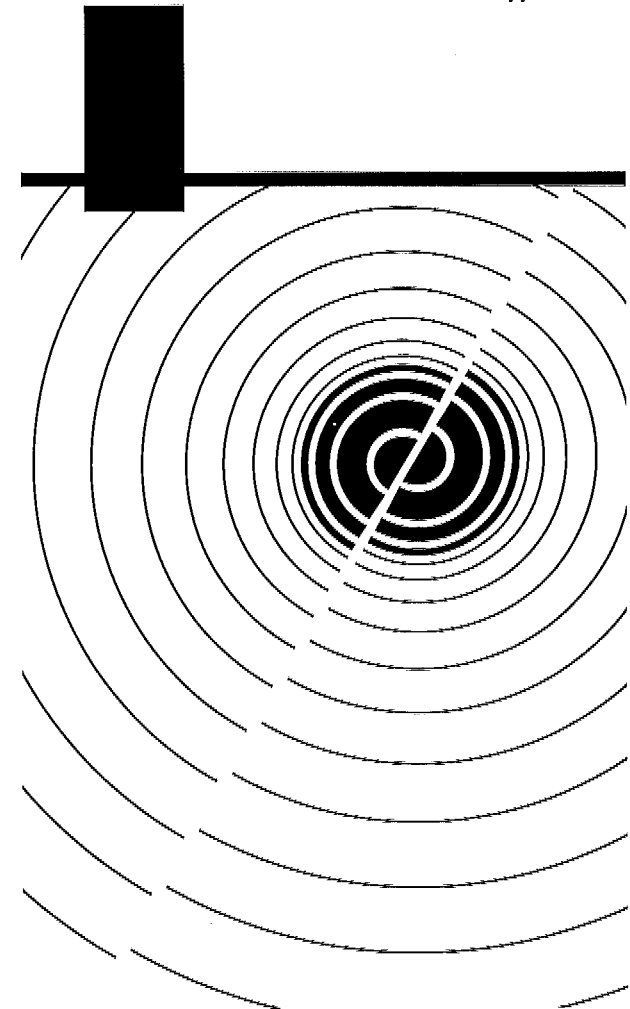
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Steps Toward an Effective Building Code-Enforcement Program

- Step 1: Adopt a model code.
- Step 2: Establish fee structures for permits and plan review.
- Step 3: Institute a systematic plan review system.
- Step 4: Determine an inspection schedule.